

Case report

A CASE OF ODONTOGENIC INFLAMMATORY
DENTIGEROUS CYST IN A CALF: MACROSCOPIC AND
HISTOPATHOLOGICAL FINDINGS

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Summary

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The dentigerous cyst is a malformation derived from deciduous and/or permanent teeth follicle and cell rests in the dental lamina. Its histopathogenesis is not entirely known. In cattle, bilaterally symmetrical dentigerous cysts are described in both mandibular and maxillary regions. In this case, the macroscopic and histopathological traits of an odontogenic dentigerous cyst in a 5-day-old female Holstein calf, which developed in the left ventral mandible and included two erupted deciduous teeth and clear fluid, was described.

Key words: calf, mandibular, odontogenic dentigerous cyst, pathomorphology

The dentigerous cyst is a congenital anomaly which appears at early stages of organogenesis. The cystic structure is generally developed together with heterotopic polydontia (Wapf & Nuss, 2005; Brown *et al.*, 2007). The cystic changes frequently originate from the sites of teeth' localisations. They are occasionally found on maxilla, mandible or muscle tissue and are associated with the gingiva. On the other hand, malformed-unerupted teeth and their remnants develop from the mesenchymal parts of tissues of dental papilla, cementum and periodontium or oral mucosa (Rüsse, 1998; Schnorr, 2001; Wapf & Nuss, 2005). During their growth, they may

cause local destructions in soft tissues and bones (Wapf & Nuss, 2005; Okuda, 2001).

There is limited information on dentigerous cysts of the calf despite their common occurrence in other species, especially in sheep (Gardner & Orr, 1990; Gardner 1993; Gioso & Carvalho, 2003; Baxter, 2004). So far, case reports on solid unilateral and multiple dentigerous cysts in several species, with or without inflammatory changes are available (Hunt *et al.*, 1990; Benn & Altini, 1996; Wapf & Nuss, 2005). Moreover, the documented cysts in cattle were located bilaterally and symmetrically in both mandibular and maxillary regions

(Gardner & Orr, 1990; Gardner 1993; Vogt & Disl, 2001; Wapf, 2005). However, in other species, they developed from incisors and maxillary canines (Okuda, 2001; Gioso & Carvalho, 2003; Baxter, 2004). Histopathology findings consisted in a cystic wall, lined with nonstratified squamous epithelium, and sometimes incomplete malformed tooth and/or destructed follicles in addition to inflammatory changes (Benn & Altini, 1996; Brown *et al.*, 2007).

A 5-day-old female Holstein calf was referred to the clinic with complaints of swelling in the left mandibular region and suckling difficulty. The animal was examined clinically and the mass on the left mandible was removed surgically by request of owners. A biopsy sample was sent to the Department of Pathology in Ankara University, Faculty of Veterinary Medicine. Tissues were evaluated macroscopically and then were fixed in 10% formalin. Tissue samples, trimmed from skin toward the cyst wall and decidual teeth, were processed routinely by automated tissue processor for histopathological examination. After that tissues were embedded in paraffin. From paraffin blocks, 5 µm tissue sections were cut and stained with haematoxylin/eosin (H/E).

The gross examination showed that the cystic mass was covered by the skin and soft tissues which belonged to the submandibular region. The cystic mass weighed approximately 70 g and was 6.5 cm in diameter. It had a fluctuating consistency and the cystic cavity was filled with clear serous fluid. On its cut section, there were one normal incisor, one erupted malformed incisor-like tooth and one partially erupted malformed tooth that was stuck to the incisor-like tooth in addition to the clear serous fluid. It was observed that the periphery of teeth was quite thickened. Moreover, a mucous like

membrane on cyst's wall, possibly originating from the crown of teeth, was also encountered. Between the skin and the cystic wall regional muscle bundles and collagenous tissue within multifocal haemorrhagic areas were observed (Fig. 1 and 2).



Fig. 1. General appearance of dentigerous cyst with skin and muscles at peripheral tissue.



Fig. 2. Cut section of cystic cavity which is covered by skin, muscle, mucosa and two malformed teeth.

In microscopical examination, there was a normal skin which was covered with stratified squamous epithelium. In the dermis and the subcutis, there were muscle bundles, connective tissue and many

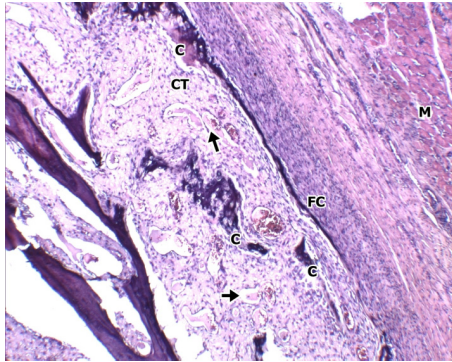


Fig. 3. Remnants of teeth with calcification (C) (bluish-purple), loose connective tissue (CT) and capillaries (arrows), fibrous capsule (FC) and muscle bundles (M) (outer side), $\times 40$, H/E.

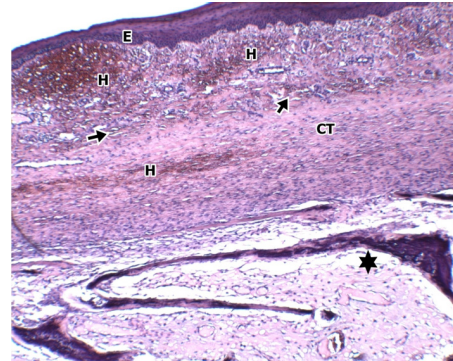


Fig. 5. Nonstratified squamous epithelium (E), multifocal haemorrhage (H), connective tissue (CT), capillaries (arrows) and remnants of teeth (star) $\times 40$, H/E.

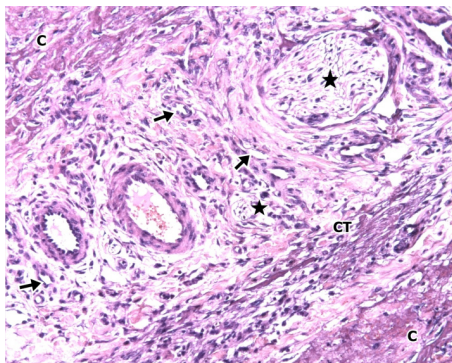


Fig. 4. Malformed tooth germ (stars), calcification (C), capillaries (arrows) and connective tissue (CT), $\times 100$, H/E.

capillaries. On the other hand, the fibrous capsule was surrounded by remnants and/or malformed teeth which belong to bluish-purple calcification area (Fig. 3 and 4). On the inner side of the area, non-stratified squamous epithelium, lining the cystic wall or cavity was found. There were also small cystic structures and tooth germs of variable size. Besides these findings, inflammatory cell reactions developed against remnants and/or malformed

teeth and the cystic wall. In general, it was seen that the infiltrations were mostly composed of macrophages and lymphocytes. Moreover, there was also a limited number of neutrophil leukocytes in some areas. On the other side, focal haemorrhagic areas were also observed on submucosa apart from budding of teeth and inflammatory cell infiltrations (Fig. 5 and 6).

Dentigerous cysts attached to the cement and enamel of tooth/teeth adherent to crown can be easily diagnosed (Azaz & Stheyer, 1973; Desai *et al.*, 2005). Also, the cysts described by Desai *et al.* (2005) and Shear (1983) are individual cysts. In the case, the observed cyst has possibly developed from the crown of the malformed teeth. Dentigerous cysts are subdivided into odontogenic and nonodontogenic types depending on whether they have deciduous permanent dental structures within. Thus, odontogenic cysts are reported as a more common cyst type than the nonodontogenic ones. However, it is documented that nonodontogenic cysts originated from “ear tooth” of horses in spite of its rare occurrence (Brown *et al.*,

2007). In this case, the described cyst was from the odontogenic type due to the prominent deciduous teeth, one of which was normal, the other has erupted malformed and last one has partially erupted malformed.

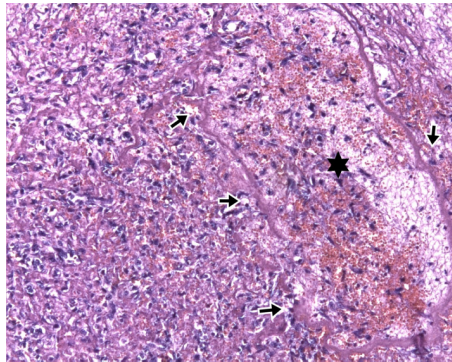


Fig. 6. Budding of teeth in submucosa (star) with haemorrhage, lymphocytes and macrophage infiltration with capillarisation (arrows) at the periphery, $\times 100$, H/E.

Moreover, several dental remnants and budding of teeth were observed by microscopy. Another issue is the developing inflammatory cell infiltration and haemorrhage at the cystic structure. It is thought to originate from the peripheral apex of teeth as a result of inflammation because follicles of deciduous teeth are not erupted. In this context, almost all cysts of this type exhibit mild or moderate inflammation, its wall surrounded by nonstratified squamous epithelium, derived from the enamel. It is also reported to constitute a network architecture composed of radicular cysts (Benn & Altini, 1996). In this case, inflammatory changes included mononuclear cells and neutrophil leukocytes, which were localised only in the submucosal region, in contrast to previously described ones. Until now, only few cases in cattle have been described as

dentigerous cysts according to reports. The cysts were predominantly situated on the maxilla and the auricula in cattle. However, there is not any specific localisation in other species (Gardner & Orr, 1990; Vogt & Disl, 2001; Wapf & Nuss, 2005). Thus the presented case, observed in the left mandibular area differed from previously documented cases with regard to both localisation and type of cysts.

In conclusion, the dentigerous cyst developed congenitally in the intermandibular region and triggered a resulting inflammatory reaction. The cyst was defined as odontogenic dentigerous cyst because it was encountered with ectopic normal and malformed deciduous teeth. The results from both macroscopic and histopathological examinations will throw light on these cysts and will assist the classification of such findings in different animal species.

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